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OSS UTILITIES CONTROL SYSTEM SOFTWARE

User Manual

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Overview

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1 Overview of the Oss Utility Control System

The OSS utility Control System main purpose is to control the primary mirror cell temperature. The mirror cell is divided up into 32 sections, where 28 of which have temperature sensors. Most of the sections in the cell also have one or more fans, with an associated heater, to control the temperature.

The heaters on each fan in the mirror cell allow temperatures to be corrected upwards There is a Coolant pump providing cooling to each fan. A miximg valve controls the percentage of glycol/water that is replaced, and what percent is taken from the telescope chiller supply line

The telescope counterweights are controlled by OSS control System. The telescope has three counterweights, one inside each altitude disk (the Z counterweights, which move parallel to the primary optical axis), and one X counterweight, which moves perpendicular to the optical axis (vertically, if the telescope is pointed at the horizon).

The mirror cover control is supplied by OSS control System. Mirror cover control can be either Local, at the OSS contactor chassis, or Remote, which allows the OSS program control.

1.1 Devices

- Adam 4021 module controls the mixing valve
- Adam 4017 module reads the counterweight real position and heater currents
- The HP unit (HP34970A) is required to sense the mirror cell temperatures, and
- the Fan Status Cards 1 and 2 are required to sense fan RPMs

Interface

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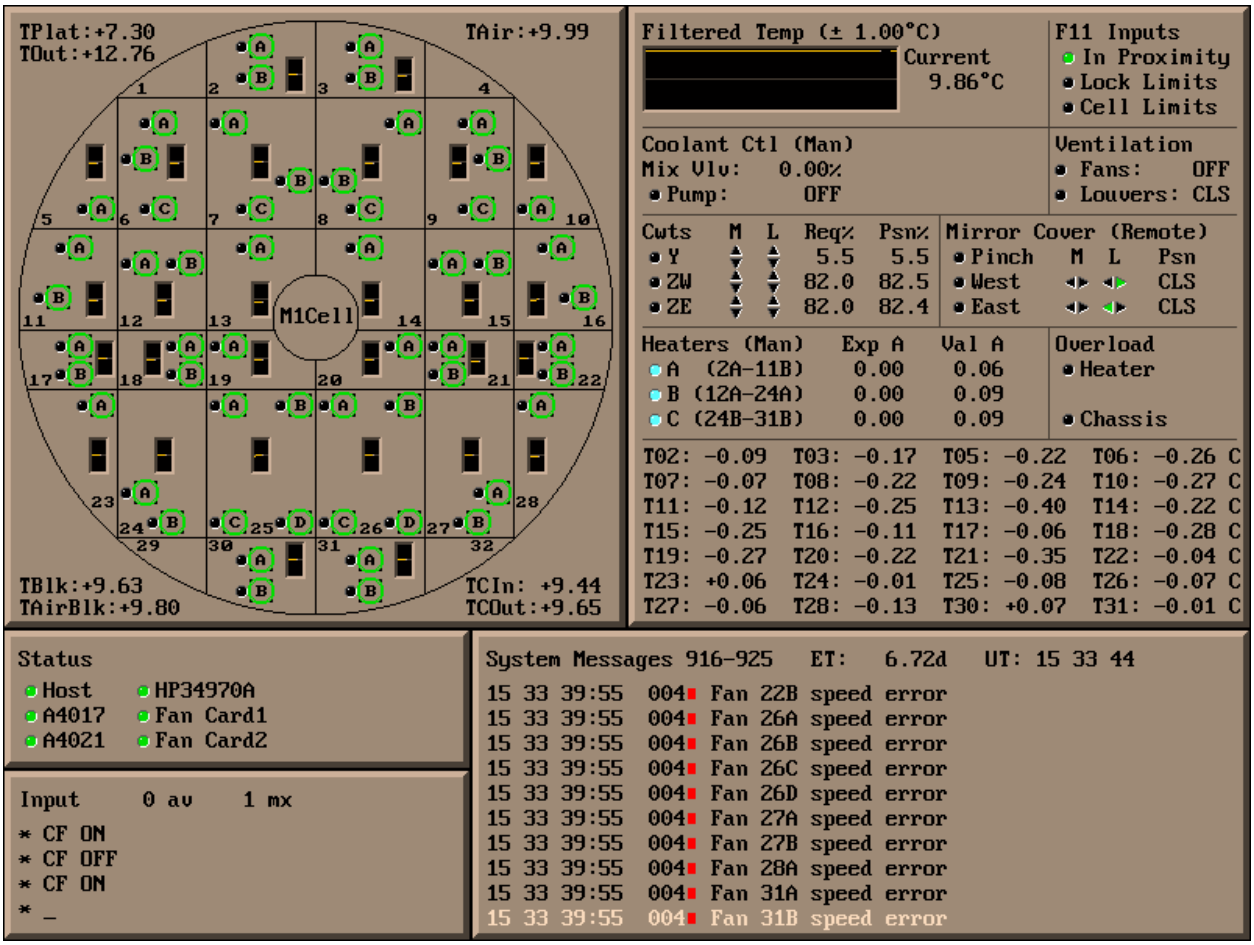
2 Oss Utility Control System Interface


TPlat:+7.30
TOut:+12.76
TAir:+9.99
M1Cell
TBlk:+9.63
TAirBlk:+9.80
TCIn: +9.44
TCOut:+9.65
Filtered Temp (± 1.00°C)
Current
9.86°C
F11 Inputs
In Proximity
Lock Limits
Cell Limits
Coolant Ctl (Man)
Mix Vlv: 0.00%
Pump: OFF
Ventilation
Fans: OFF
Louvers: CLS
Cwts M L Req% Psn%
Y 5.5 5.5
ZW 82.0 82.5
ZE 82.0 82.4
Mirror Cover (Remote)
Pinch M L Psn
West CLS
East CLS
Heaters (Man) Exp A Val A
A (2A-11B) 0.00 0.06
B (12A-24A) 0.00 0.09
C (24B-31B) 0.00 0.09
Overload
Heater
Chassis
T02: -0.09 T03: -0.17 T05: -0.22 T06: -0.26 C
T07: -0.07 T08: -0.22 T09: -0.24 T10: -0.27 C
T11: -0.12 T12: -0.25 T13: -0.40 T14: -0.22 C
T15: -0.25 T16: -0.11 T17: -0.06 T18: -0.28 C
T19: -0.27 T20: -0.22 T21: -0.35 T22: -0.04 C
T23: +0.06 T24: -0.01 T25: -0.08 T26: -0.07 C
T27: -0.06 T28: -0.13 T30: +0.07 T31: -0.01 C
Status
Host HP34970A
A4017 Fan Card1
A4021 Fan Card2
Input 0 av 1 mx
* CF ON
* CF OFF
* CF ON
* _
System Messages 916-925 ET: 6.72d UT: 15 33 44
15 33 39:55 004 Fan 22B speed error
15 33 39:55 004 Fan 26A speed error
15 33 39:55 004 Fan 26B speed error
15 33 39:55 004 Fan 26C speed error
15 33 39:55 004 Fan 26D speed error
15 33 39:55 004 Fan 27A speed error
15 33 39:55 004 Fan 27B speed error
15 33 39:55 004 Fan 28A speed error
15 33 39:55 004 Fan 31A speed error
15 33 39:55 004 Fan 31B speed error

2.1 Primary Mirror Cell Display

One of the OSS utility program's main purposes is to control the primary mirror cell temperature. The current state of the cell is displayed in the top left panel, as a graphical representation. The temperature sensors are

differential, and display the temperature difference between that section and ambient (measured from a block of copper). Each section has a small graph that shows the section's temperature trend. The average of all 28 sections over the last 24 hours is displayed in the larger graph at the top left of the next panel over. The scale of the charts is displayed at the bottom left of the panel, and can be changed with the TS command.

A fan/heater combination is identified by the section # and the fan letter. Thus, the top left fan and heater are referred to as 2A. The circle around the letter (representing the fan) is colored red if the fan is off or running outside of a nominal speed. If this is the case, the program won't allow the associated heater to turn on. The heater with each fan is shown as an LED immediately to the left of each fan. If the heater is on, the LED will be green, and black if it's off.

2.2 F11 Secondary Status Display

The top right of the right status panel shows the three F11 secondary inputs. * At the time of this writing the inputs had not been connected. *

2.3 Ventilation Fan and Louver Display

The section below the Average Temperature graph displays the current cell ventilation and louver fan status. Note that these are a set of eight fans and louvers around the perimeter of the mirror cell, independent of the fans mounted on the back of the cell. The fan status can be off, low speed, or high speed. The louvers can be open, closed, or unknown (displayed as question marks). If the louvers are in an unknown state, they will be homed the next time a louver command is given. To the left of the fan and louver labels are LEDs. These will be black if the fans/louvers are off/closed. They will light green if the fans/louvers are open/on.

2.4 Coolant Pump / Mixing Valve Display

To the right of the ventilation fan and louver status is a section that displays the coolant pump and mixing valve status. The coolant pump status can be either off, on, or overloaded. These three conditions are printed to the right of the pump label. They are also reflected in the color of the LED to the left of the label: black = off, green = on, and red = overload.

An overload condition must be cleared on the telescope inside the OSS Utilities Contactor Chassis. To reset the overload relay, press the reset

button on contactor CT4. CAUTION: HIGH VOLTAGE IS PRESENT. ONLY QUALIFIED PERSONNEL SHOULD PERFORM THE RESET OPERATION.

The mixing valve output will be listed as a percentage. * At the time of this writing it's not known if it is the percent recirculated coolant or the percent of fresh coolant. * Note that the mixing valve is controlled by the Adam 4021 module, so if communication is down with it the mixing valve cannot be controlled, and the current value may be listed as 999.99%.

2.5 Counterweight Display

The section below the ventilation status is dedicated to the telescope's counterweights. To the left of the three counterweights labels are LEDs which will turn from black (normal) to red in the case of an overload. This condition must be reset on the telescope. The thermal overload relays for the three counterweights are located inside the OSS Utilities Contactor Chassis. To reset an overload relay press the reset button contactor CT3, CT5 or CT6. CAUTION: HIGH VOLTAGE IS PRESENT. THE RESET OPERATION SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

Counterweight motion is shown under the "M" column. For the Z and X counterweights, if the up or down arrows light green it indicates forward or reverse motion, respectively. Limit switches are indicated in the "L" column. The up or down LEDs will turn from black to red if a limit is encountered. If both are red, there is an error reading the limits or a limit is broken. In case a move command with a numeric argument has been issued, the requested value is shown in the "Req%" column. The final column "Psn%", displays the counterweights real positions. These are read by the Adam 4017 module, which must be communicating for these readings to be valid. The 4-20 mA reading from the Adam 4017 has been scaled, so the position shown ranges as a percent from 0.0...99.9. The telescope is balanced with the following counterweights positions: X = 6.6%, W = 59.2%, E = 59.1%.

2.6 Mirror Cover Display

To the right of the counterweight display is the status of the mirror covers. The status of the Local / Remote switch is displayed next to the mirror cover label.

As in the other subsystems, each mirror cover has an overload warning, which is indicated if the LED left of each mirror cover label turns from black to red. Again, the overload condition must be reset on the telescope. The thermal overload relays for the two mirror covers are located inside the OSS

Utilities Contactor Chassis. To reset an overload relay press the reset button on contactor CT1 or CT2. CAUTION: HIGH VOLTAGE IS PRESENT. THE RESET OPERATION MUST BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

The “M” column displays mirror cover motion, and the “L” column displays the limit switch status. For the West mirror cover, when the right motion arrow lights green that mirror cover is closing, and when the left motion arrow lights green the mirror cover is opening. Likewise, if the right limit arrow lights green the mirror cover is closed, and if the left limit arrow lights green the mirror cover is open. If both limit arrows go red, there is either an error reading the limits or a limit switch is malfunctioning. The arrow meanings are reversed for the East mirror cover, the left arrows indicate closing/closed and the right arrows indicate opening/opened. To remind you, the actual position is displayed in text to the right of the “M” and “L” columns under “Psn”, with “OPN” (open), “CLS” (closed), “MID” (midway), and “ERR” (error) being the possibilities.

Finally, there is an indication of the pinch switch, which is triggered if the mirror covers close on something (like a person). If the pinch switch is triggered, its LED will go from black to red, and further motion will be impossible until it is reset. To reset the mirror cover pinch latch, turn the Mirror Cover Control key switch on the OSS Utilities Contactor Chassis to the Off position then back to Remote. CAUTION: ALWAYS CHECK THE MIRROR COVERS TO DETERMINE THE CAUSE OF TRIGGER.

2.7 Heater Current Display

The next section down shows the status of the currents being supplied to the heaters. The mode the heaters are in is displayed to the right of the “Heaters” title and is either “Man” (manual) or “Aut” (automatic). In manual mode heaters are toggled individually, in auto mode each cell section is controlled by a PID loop automatically * At the time of this writing this has not been implemented *. The current required by the heaters is supplied by three phases (A, B, and C). Heaters 2A through 11B are supplied by Phase A, heaters 12A through 24A are supplied by Phase B, and heaters 24B through 31B are supplied by Phase C as shown onscreen. The expected current draw (based upon the number of heaters active) is displayed in the first column, and the current drawn in amps is in the second column. Note that communication with the Adam 4017 module must be OK for the currents to be read. The LED to the left of each phase label will be red if that phase’s current differs from the expected amount by too much, and all heaters on that phase will be turned off * At the time of this writing this has not been implemented *.

2.8 Oss Chassis Circuit Breaker Display

The next section to the right displays the Heaters and OSS Chassis overload inputs. The LEDs to the left of the labels should be black during normal operation. If the Heaters / OSS Chassis drew too much current, the overload will be tripped and the LEDs will turn from black to red. If this happens, the overload must be reset on the telescope.

The Heater Overload circuit breaker is located in the OSS Utility Chassis. To reset the breaker you will need to close the east mirror cover and push up CB1 inside the chassis.

The Chassis circuit breaker is located in the OSS Utilities Contactor Chassis. To reset the breaker, push up CB2 inside the chassis.

CAUTION: HIGH VOLTAGE IS PRESENT IN THE ABOVE TWO CHASSIS. ONLY QUALIFIED PERSONNEL SHOULD PERFORM THE RESET OPERATION. Finding the cause of the overload would be useful.

2.9 Communications Status Display

The last panel is entitled “Communications Status”. It simply shows at a glance which devices are communicating with the OSS successfully and which have errors. If the LED next to a device name is red, there are com errors, and if it's green communication is operational. The Host is the TCS computer. The Adam 4017 is required for sensing counterweight positions and heater currents. The Adam 4021 is required to control the mixing valve. The HP unit is required to sense the mirror cell temperatures, and the Fan Status Cards are required to sense fan RPMs.

Commands

3

3 Commands Summary

All OSS (Optical Support System) commands begin with a command code, followed by one or more arguments. The arguments and the command must all be separated by spaces. Letters may be upper or lower case. The backspace key moves the cursor back one character at a time. All commands are terminated by a <cr>. Hit <F1> for a quick command help screen.

3.1 User Commands

Command	Description
VF *n*	Set cell ventilation fans to *n* (*n* = OFF / LOW / HIGH).
VL *n*	Set cell ventilation louvers to *n* (*n* = CLS / OPN, closed or open).
CP *n*	Set coolant pump to *n* (*n* = OFF/ON).
CW/CE/CY *n*	Set West Z / East Z / Y counterweight motion to *n*, where *n* = U / D / S, up, down, or stop, *n* = 0.0 … 99.9.
MV *n*	Set mixing valve to *n* % open (*n* = 0.0 … 100.0).
MW/ME *n*	Set West / East mirror cover to *n*

	(*n* = CLS / OPN / S, closed, open, or stopped).
MC n	West and East mirror cover to *n* (*n* = CLS / OPN / S, closed, open, or stopped).
CF *n*	Set all 56 fans in M1 cell to *n* (*n* = OFF / ON).
TC1 *n*	Turn primary mirror temperature control to *n*. (#1 Strategy) (*n* = OFF / ON, manual or automatic).
TC2 n	Turn primary mirror temperature control to *n*. (#2 Strategy) (*n* = OFF / ON, manual or automatic).
KP/KI/KD	
TCO n	Offset parameter in #1 temp control strategy
RT n	Reference temperature for #2 temp control strategy
CLEAR n	Test bit by bit the 8 cell fans and louvers, with n = 3, 6, 4 and 5
SET n	Setting bit by bit n = 3, 6, 4 and 5
TT	Toggles all 28 cell temperature display between absolute and relative to TAir

3.2 Message Commands

Command	Description
<Up>	Scroll system message display back one line.

<Pg Up>	Scroll system message display back one page
<Down>	Scroll system message display forward one line
<Pg Dn>	Scroll system message display forward one page
<Home>	Set system message display to show the first message
<End>	Set system message display to show the current message

3.3 Display Commands

Command	Description
TS *n*	Set temperature scale for display to ± *n* (*n* = 0.01 ... 99.99 ℃)
<F1>	Display online help screen.
<Scroll Lock>	Pause/Resume system log messages
VERB *n*	Set system log verbose level to *n* (*n* = 0 ... 2)

3.4 Engineering Commands

Command	Description

H *n*	Toggle heater on fan *n* on or off (*n* = 2A, 13B, etc.).
F *n*	Display current RPMs of fan *n* (*n* = 2A, 13B, etc.).
T2	Terminal with Adam modules on COM 2:.
T9	Terminal with Adam modules on COM 2: at 9600 baud (for module setup).
T3	Terminal with Hewlett Packard unit on COM 3:.
T4	Terminal with DGH on COM4: at 300 baud for setup
<F2>	Dump system log to the file “TEMP.LOG”.
<F3>	Dump screen to file “SCREEN.BMP” (in Windows BMP format).

3.5 Other Commands

Command	Description
Q / EXIT	Exit the program.

Configuration

4

4 Oss Utility Configuration

4.1 Oss.ini file, Magellan I

```
; OSS.INI
; Last modified: 3/1/2003, JMS.
;
; This file contains all easily modified initialization data for the
; OSS Utility program. Lines starting with a ";" are ignored.
; Every other line contains a description followed by an equal sign
; follwed by a data value. DO NOT change the order of the data values
; (the program ignores the description in front of them) and DO NOT
; add blank lines between values.
;
; Telescope, Baade = 1, Clay = 2
Telescope = 1
;
; ** Serial communication constants **
;  Address of this computer on the line to the host computer
Address = "I"
;  Prompt character for this computer
Prompt = ":"
;  Response character of this computer
Response = "~"
```

```
; Amount in parts-per-million to speed up or slow down the system clock
; Use this to make the system clock as accurate as desired
ClockPPM = 465
;
; ** Heater constants ***
;
; Maximum time a heater bit can be on before resetting in seconds
;  (This avoids triggering the hardware watchdog)
MaxHeaterTime = 50
; Time in ms all heaters must be off to satisfy the heater watchdog
HeaterCycleTime = 250
; Current in amps per heater that's on
CurrentPerHeater = 0.89
; Maximum error in percent that the heater current can deviate from its
;  expected value
MaxHeaterCurrentError = 10.0
; Initial temperature scale (+/- degrees C)
Cell.TempScale = 1.0
;
; ** Fan constants ***
;
; Maximum allowable fan RPMs
MaxFanSpeed = 3000
; Minimum allowable fan RPMs
MinFanSpeed = 2000
;
; ** Counterweights encoder scaling factors **
;
XCSFA = 1.413
```

```
XCSFB = 7.698

WCSFA = 1.433

WCSFB = 7.966

ECSFA = 1.416

ECSFB = 7.701

;

; ** Mixing valve maximum opening **

Cell.MVmaxop = 50.0

;

; Allowable -Delta and +Delta between platinum truss temperature and

; center section air temp (measured by 4 wires above primary mirror)

Cell.PlatmD = -7.0

Cell.PlatpD = 7.0
```

4.2 Oss.ini , Magellan II

4.3 Oss.ini Description

The OSS Utility program reads a small amount of configuration data from the file “OSS.INI”, which is in the same directory as the OSS Utility program. This is a simple text file which can be edited with any text editor. All lines starting with a “;” are ignored, all other lines are significant. Non-comment lines will have a label, an equal sign, and a value. Do not change the order of the lines, or add blank lines that aren’t begun with a “;”, as this will interfere with the OSS program’s ability to read the file. The following values can be set in this file:

Address: The address character that the OSS program responds to (as per the control system serial communication documents). This should be “I”.

Prompt: The prompt character that the OSS program responds to. This should be “:”.

Response: The response character that precedes all OSS replies. This should be “~”.

ClockPPM: A number, in parts per millionth of a second, to speed up or slow down the system clock. This should be used to match UT as closely as possible. To set, allow the TCS to set the OSS's UT several times over the course of many hours. If the timestamps of the UT Set messages in the system log are ahead of the time being set, increase ClockPPM by 1000000 * (amount ahead by in seconds / time since last UT Set message in seconds), otherwise decrease by the same amount. This number will have to be modified if the computer being used to run the OSS program is changed. Set this number to zero if you're unsure.

MaxHeaterTime: Maximum time a heater can be on in seconds before the program automatically cycles it to prevent the heater watchdog from triggering. Should be about 50.

HeaterCycleTime: Time in milliseconds a heater must be off during a cycle to satisfy the heater watchdog.

CurrentPerHeater: Current in amps per heater that's on (used to calculate expected current).

MaxHeaterCurrentError: Maximum heater current deviation from expected in percent.

Cell.TempScale: Temperature scale in degrees C at program startup.

MaxFanSpeed: Highest fan RPMs allowed before flagging an error.

MinFanSpeed: Lowest fan RPMs permitted before flagging an error.

The following are normalizing scaling factors for the counterweight encoder values:

XCSFA, XCSFB: X counterweight encoder scaling factors, transforming raw units (12"–117") to the range 0.2% - 99.7%.

WCSFA, WCSFB: Z West counterweight encoder scaling factors, transforming raw units (12"–116") to the range 0.2% - 99.7%.

ECSFA, ECSFB: Z East counterweight encoder scaling factors, transforming raw units (12"–116.5") to the range 0.2% - 99.7%.

4.4 Starting the Program

To start the OSS program, push the reset button (the black rocker switch just below the red power switch) on the computer, or cycle power to it from the circuit breakers at the base of the telescope. The program will load automatically from the solid-state disk. Resetting the computer insures that the system will start each time in the proper state.

When the program is loaded, you should see the usual video display of OSS utility data. You can type commands which appear at the "*" prompt in the input panel. At the top of the input panel the average and maximum cycle times for the program's main loop are displayed in milliseconds.

Status messages are displayed in the system message box. The UT at which the message occurred is followed by a three-digit message identification code. A red LED indicates that the message describes error. A green LED indicates that the message describes a normal condition or success. Most errors are caused by serial communication errors, or by some piece of remote equipment being turned off. A certain number of errors may occur when the program is loaded, before the serial communications are properly initialized. A few errors will occur during normal operation.

The messages are numbered from 0 to 999. When the message buffer is full, new messages are written over the old ones starting from the beginning (so message 1000 is written to location 0 and so on). The most recent message is displayed in white. You can scroll back and forth through the message buffer using the cursor keys. To return to the page with the most recent message, be sure to use <End>, or else new messages will not appear on your screen (although new messages will *always* be written to the message buffer).

The elapsed time, in days, that the program has been running is shown next to the "ET" entry, and the current UT is shown as well. The UT is set by the CMOS clock in the computer when the program starts, but it is updated by the TCS as soon as communication is established, and once per hour after that.

Serial Communication

5

5 Control System Serial Communication Standards

There is always a host (upstream) computer, and a guest (downstream) computer. The host computer is frequently the TCS, with the guest being Oss Utility computer. The host system sends a command, and the guest responds immediately to that command. Guest computers never broadcast without being queried, which allows multiple guests to be chained on the same serial line.

Full command format:

:Indddddddddccr

The "**:**" is the prompt character to initiate communication. **l** is the guest computer's unit address, in this case is Oss Utility computer. **n** is a command number, **d**'s are data specific to the command (variable length), **cc** is a checksum, and **r** is a carriage return (ASCII 13).

Full response format:

~Indddddddccr

The "**~**" is the response character for guest computer responses. **l** is the guest computer's unit address. **n** is the command number this is in response to, **d**'s are data specific to the response (variable length), **cc** is a checksum, and **r** is a carriage return (ASCII 13).

For very short commands and responses the checksum may be omitted (this is noted in the command description).

For all commands and responses that include a checksum, the checksum is composed of two hexadecimal digits (from 0-F). The checksum is calculated by starting with zero and XORing it with all characters in the message from the unit letter to the last data character before the checksum (the underlined part of the command and response above).

Commands that are received but misunderstood (checksum wrong, unknown command, etc) are replied to like this:

~I?r

Most guest computers maintain a running system log that contains important messages and all system status information. Each also maintains a pointer into that log that keeps track of the oldest message that hasn't been sent to the host computer. The "2" and "3" commands let the host computer command the guest computer to transmit one of its log entries or re-transmit the last entry. This is referred to as the "Engineering Data Stream", or EDS.

Command Summary:

2: Query Next EDS Message

3: Repeat Last EDS Message

4: Set UT

9: Free-form Command

5.1 Command Description

2: Query Next EDS Message

Commands the guest computer to send its oldest un-sent EDS log entry, and advance its internal pointer to the next EDS log entry.

Command Format: :I2r (note that this command has no checksum)

Response Format: ~I2qqnnttttttttfffddddddccr

I: Guest Oss Utility computer address (usually an upper-case letter)

qq: Two-digit number of EDS messages left in the guest queue

nn: Two-digit number of characters in the message (in the underlined section). 00 if no message available.

tttttttt: Eight-digit message time stamp (no punctuation), with two-digit hour, two-digit minute, two-digit second, and two-digit hundredths of a second.

fff: Three-digit message number. Message numbers from 0-799 denote errors, 800-899 are numberical data formats, and 900-999 are successes.

ddddddd: Variable length message data section. For error and success messages, typically a simple text message. For numeric data formats, a combination of ASCII, decimal, and hexadecimal characters/digits, with the format being determined by the particular message number.

cc: Checksum, described above.

r: ASCII charater 13, a carriage return.

3: Repeat Last EDS Message

Commands the guest computer to re-send the last message it sent (implying that the host computer had a serial communication error during the last reponse). The guest's internal pointer should remain unchanged.

Command Format: :I3r (note that this command has no checksum)

Response Format: ~I3qqnnttttttttfffddddddccr

I: Guest computer address (usually an upper-case letter)

qq: Two-digit number of EDS messages left in the guest queue

nn: Two-digit number of characters in the message (in the underlined section). 00 if no message available (there is no time stamp, message number, or data in this case).

ttttttt: Eight-digit message time stamp (no punctuation), with two-digit hour, two-digit minute, two-digit second, and two-digit hundredths of a second.

fff: Three-digit message number. Message numbers from 0-799 denote errors, 800-899 are numberical data formats, and 900-999 are successes.

ddddddd: Variable length message data section. For error and success messages, typically a simple text message. For numeric data formats, a combination of ASCII, decimal, and hexadecimal characters/digits, with the format being determined by the particular message number.

cc: Checksum, described above.

r: ASCII charater 13, a carriage return.

4: Set UT

Commands the guest computer to set its clock to the Universal Time given in this command. The control computers keep their clocks synchronized to GPS-provided universal time in this way.

Command Format: :I4tttttttccr

Response Format: ~I4er (note that this response has no checksum)

I: Guest computer address (usually an upper-case letter)

ttttttt: Eight-digit universal time (no punctuation), with two-digit hour, two-digit minute, two-digit second, and two-digit hundredths of a second.

cc: Checksum, described above.

r: ASCII charater 13, a carriage return.

e: Error flag: 0 if an error occurred, 1 if OK.

9: Free-form Command

Sends the guest Oss Utility computer a free-form command, typically similar to the commands entered via the guest computer's keyboard. This is used to command moves, homes, etc.

Command Format: :I9nnddddddccr

Response Format: ~I9ennmmmmccr

I: Guest computer address (usually an upper-case letter)

nn: Two-digit number of characters in the message (in the underlined section). 00 if no message available.

ddddddd: Variable length free-form command section. This section will contain a command parseable by the guest computer, such as "MOVE 1000"

cc: Checksum, described above.

r: ASCII charater 13, a carriage return.

e: Error flag: 0 if OK, 1 or higher if an error occurred.

mmmm: Variable length diagnostic message (such as "Move ignored, brake on"). This should be printed out by the host computer in the command input box if the command was given by the user, or in the system log if the command was given by an automated routine in the host program. nn=00 in the response if there is no diagnostic message.

Log Message System

6

6 Log Message System

Last updated 10/29/2000

Note that for error messages with an error code, the error code is just used to find where in the program's source code the error occurred, and is used to find bugs. The system log in verbose mode should be used in most cases to diagnose strange problems. Then, just recreate the problem/error message and hit the log dump function key. There should be very explicit error messages that tell what was sent to devices, and how they responded, and what the program was expecting.

// Errors (0-799)

001: "Incorrectly formatted UT message from TCS"

The TCS computer sent a Universal Time set command, but it was garbled. Check communications link, and look at the log in verbose mode to see what the TCS is sending.

002: "Adam x com error y"

The Adam module x on COM2: had a communications error. Check communication with the T2 command, or put the log in verbose mode to see what is being said between the computer and the Adam. The error number given helps pinpoint where in the source code the error occurred.

003: "Adam x error messages suspended"

The Adam module x on COM2: had too many consecutive communication errors. Further error messages will be suppressed.

004: "Fan x speed error"

The listed fan is running too slowly or too quickly. Check fan and fan status card communication/operation.

005: "Fan Status Card x com error y"

The Fan Status Card x on COM2: had a communications error. Check communication with the T2 command, or put the log in verbose mode to see what is being said between the computer and the card. The error number given helps pinpoint where in the source code the error occurred.

006: "Fan Status Card x error messages suspended"

The Fan Status Card x on COM2: had too many consecutive communication errors. Further error messages will be suppressed.

007: "HP com error x"

The HP on COM3: had a communications error. Check communication with the T3 command, or put the log in verbose mode to see what is being said between the computer and the HP. The error number given helps pinpoint where in the source code the error occurred.

008: "HP error messages suspended"

The HP on COM3: had too many consecutive communication errors. Further error messages will be suppressed.

010: "Host com error x"

There was a host (TCS) communications error. Put the log into verbose mode to see what is being said between the computer and the TCS. The error number given helps pinpoint where in the source code the error occurred.

011: "Host error messages suspended"

The host (TCS) had too many consecutive communication errors. Further error messages will be suppressed.

014: "DGH x error message suspended"

6.1 EDS Logs data formats (800-899)

800: Communication Status of temperature sensors, ventilation fan, louvers, chassis, cooling pump, etc. Information about primary mirror sensors status.

Format: 800aabccddddeeffffffgggggghhhhhhiiiiiijjjjjjkkkkkk

aa: Communication status (hex)

value 0: 0 = Adam 4017 com status OK, 1 = Error

1: 0 = Adam 4021 com status OK, 1 = Error

2: 0 = HP com status OK, 1 = Error

3: 0 = Fan Status Card 1 com status OK, 1 = Error

4: 0 = Fan Status Card 2 com status OK, 1 = Error

5: 0 = Host com status OK, 1 = Error

b: F11 Inputs (hex)

value 0: In Proximity (1 = Active)

1: Lock Limits (1 = Active)

2: Cell Limits (1 = Active)

cc: Chassis, ventilation fan, louver, and coolant pump value

value 0: OSS Chassis overload (1 = Active)

1-2: value 1 = 0 and 2 = 0: Vent fans off

1 = 1 and 2 = 0: Vent fans low

1 = 0 and 2 = 1: Vent fans high

3-4: 3 = 0 and 4 = 0: Vent louvers unknown

3 = 1 and 4 = 0: Vent louvers closed

3 = 0 and 4 = 1: Vent louvers open

5-6: 5 = 0 and 6 = 0: Coolant pump off

5 = 1 and 6 = 0: Coolant pump on

5 = 0 and 6 = 1: Coolant pump overload

dddd: Mixing valve setting in % * 10 (997 = 99.7%) (decimal)

ee: Heater status (hex)

0: Heater control, 0 = Manual, 1 = Automatic (PID control)

1: Heater status, 0 = OK, 1 = Overload

2: Phase A Expected matches Current (0=OK, 1=Doesn't match)

3: Phase B Expected matches Current (0=OK, 1=Doesn't match)

4: Phase C Expected matches Current (0=OK, 1=Doesn't match)

ffffff: Phase A Current in amps * 100 (785 = 7.85A) (decimal)

gggggg: Phase A Expected Current in amps * 100 (785 = 7.85A) (decimal)

hhhhhh: Phase A Current in amps * 100 (785 = 7.85A) (decimal)

iiiiii: Phase A Expected Current in amps * 100 (785 = 7.85A) (decimal)

jjjjjj: Phase A Current in amps * 100 (785 = 7.85A) (decimal)

kkkkkk: Phase A Expected Current in amps * 100 (785 = 7.85A) (decimal)

801: Counterweight information status.

Format: 801aabbbbbccdddddeeffffggg

aa: X Counterweight (hex)

0: X counterweight overload (0 = OK, 1 = Overload)

1-2: bit 0 = 0 and bit 1 = 0: No motion

0 = 1 and bit 1 = 0: South motion (down arrow)

0 = 0 and bit 1 = 1: North motion (up arrow)

3-4: bit 0 = 0 and bit 1 = 0: No limit

0 = 1 and bit 1 = 0: South limit (down arrow)

0 = 0 and bit 1 = 1: North limit (up arrow)

0 = 1 and bit 1 = 1: Both limits (error)

bbbbb: X Counterweight position in % * 100 (997 = 99.7%) (decimal)

cc: West Z Counterweight (hex)

0: West Z counterweight overload (0 = OK, 1 = Overload)

1-2: position 0 = 0 and 1 = 0: No motion

0 = 1 and 1 = 0: Up motion

0 = 0 and 1 = 1: Down motion

3-4: value 0 = 0 and 1 = 0: No limit

0 = 1 and 1 = 0: Up limit

0 = 0 and 1 = 1: Down limit

0 = 1 and 1 = 1: Both limits (error)

ddddd: East Z Counterweight position in % * 100 (997 = 99.7%) (decimal)

ee: East Z Counterweight bits (hex)

0: East Z counterweight overload (0 = OK, 1 = Overload)

1-2: 0 = 0 and 1 = 0: No motion

0 = 1 and 1 = 0: Up motion

0 = 0 and 1 = 1: Down motion

3-4: 0 = 0 and 1 = 0: No limit

0 = 1 and 1 = 0: Up limit

0 = 0 and 1 = 1: Down limit

0 = 1 and 1 = 1: Both limits (error)

fffff: west Z Counterweight position in % * 100 (997 = 99.7%) (decimal)

ggg: Mirror cover status (hex)

0: Mirror cover mode (0 = Remote, 1 = Local)

1: Mirror cover pinch switch (0 = OK, 1 = Active)

2-3: 2 = 0 and 3 = 0: West Mirror cover stopped

2 = 1 and 3 = 0: West Mirror cover opening

2 = 0 and 3 = 1: West Mirror cover closing

4-5: 4 = 0 and 5 = 0: West Mirror cover no limit

4 = 1 and 5 = 0: West Mirror cover open limit

4 = 0 and bit 5 = 1: West Mirror cover close limit

4 = 1 and 5 = 1: West Mirror cover both limits (error)

6: West Mirror cover overload (0 = OK, 1 = Active)

7-8: bit 7 = 0 and 8 = 0: East Mirror cover stopped

7 = 1 and 8 = 0: East Mirror cover opening

7 = 0 and 8 = 1: East Mirror cover closing

9-10: bit 9 = 0 and 10 = 0: East Mirror cover no limit

9 = 1 and 10 = 0: East Mirror cover open limit

9 = 0 and 10 = 1: East Mirror cover close limit

9 = 1 and 10 = 1: East Mirror cover both limits (error)

11: East Mirror cover overload (0 = OK, 1 = Active)

802: Fan and heater status

Format:802aaaabbbbccccddddeeeeffffgggg

aaaa: Heater and fan status (Fans 2A to 6C)

0: Fan 2A Heater (0 = Off, 1 = On)

1: Fan 2A Fan Status (0 = OK, 1 = Error)

2: Fan 2B Heater (0 = Off, 1 = On)

3: Fan 2B Fan Status (0 = OK, 1 = Error),etc.

bbbb: Heater and fan status (Fans 7A to 9B) (see a:)

cccc: Heater and fan status (Fans 9C to 14A) (see a:)

dddd: Heater and fan status (Fans 15A to 18B) (see a:)

eeee: Heater and fan status (Fans 19A to 24A) (see a:)

ffff: Heater and fan status (Fans 24B to 26C) (see a:)

gggg: Heater and fan status (Fans 26D to 31B) (see a:)

803: Fan Speeds (Fans 2A to 6C)

Format: 803aaaabbbbccccddddeeeeffffgggghhhh

aaaa: Fan 2A speed in RPMs

bbbb: Fan 2B speed in RPMs

804: Fans 7A to 9B speeds

Format: 804aaaabbbbccccddddeeeeffffgggghhhh

805: Fans 9C to 14A speeds

Format: 805aaaabbbbccccddddeeeeffffgggghhhh

see 803

806: Fans 15A to 18B speeds

Format: 806aaaabbbbccccddddeeeeffffgggghhhh

see 803

807: Fans 19A to 24A speeds

Format: 807aaaabbbbccccddddeeeeffffgggghhhh

see 803

808: Fans 24B to 26C speeds

Format: 808aaaabbbbccccddddeeeeffffgggghhhh

see 803

809: Fans 26D to 31B speeds

Format: 809aaaabbbbccccddddeeeeffffgggghhhh

see 803

810 - 813: Mirror temperatures, relative to air temp, in four groups of seven readings.

Format: 81iaaaaaabbbbbbccccccddddddeeeeeeffffffgggggcc

aaaaaa - gggggg: Temperature in deg celcius times 1000, as signed integer

814: All the other temperatures.

Format: 814aaaaaabbbbbbccccccddddddeeeeeeffffffgggggghhhhhhcc

aaaaaa: air temp, TAir
bbbbbb: platinum wire, TPlat
cccccc: copper block, TBlk
dddddd: chilled liquid in, TCIn
eeeeee: chilled liquid out, TCOut
ffffff: air around copper block, TAirBlk
gggggg: median of mirror temps, Filtered Temp
hhhhhh: average temp of four sensors above mirror, TOut
cc: checksum

All readings in deg celcius times 1000.

// Successes (900-999)

992: "Host error messages resumed"

Communication with the host (TCS) was restored.

993: "Mixing Valve set to x"

The mixing valve was set to the given percentage open.

994: "HP error messages resumed"

Communication with the HP was restored. Future com errors will be displayed again.

995: "Fan Status Card x error messages resumed"

Communication with the given Fan Status Card was restored. Future com errors will be displayed again.

996: "Adam x error messages resumed"

Communication with the given Adam module was restored. Future com errors will be displayed again.

997: "Screen dumped to SCREEN.BMP"

The screen was captured and dumped to the file SCREEN.BMP. It can be viewed in Windows.

998: "UT set by TCS to xx xx xx.xx"

The TCS sent a command to set Universal Time. The command was received sucessfully, and UT was set.

999: "Program startup (vx.xx)"

First log entry after program startup (with version number)

System Details

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7 Oss Utility Control System differences between Magellan I and II

Troubleshooting

8

8 Troubleshooting